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# Teratological fruits of Ptelea

J. Arthur Harris

(with plate 17)

For the most part the literature of plant teratology is composed of purely casual observations, chiefly records of bizarre structures which have caught the attention of the observer who contented himself with describing and theorizing. But the work of Magnus, Masters, Penzig, de Vries, Vöchting, and some others has shown that teratology can be taken up as a problem for serious and continued work, and with profitable results.

Some years ago I became much interested in certain problems involving the frequency and degree of development of plant anomalies commonly classed as teratological. Among the things it is desirable to determine concerning teratological structures through the examination of large series of material are:

Frequency of occurrence.
Range of variability in development.
Continuity or discontinuity in development.

One of the series of material upon which observations were begun in the winter of 1907 I have not found time nor opportunity to continue and the data are put on record here for the benefit of anyone occupied with problems of this kind.

Several observers have described trimerous fruits in *Ptelea trifoliata*, as Roeper,* Schimper,† and Masters.‡ As material for further work I used the numerous fruits of eleven shrubs growing in the North American Tract of the Missouri Botanical Garden. Two objects were in view. First, to gain some rough approximation to the frequency with which anomalous fruits occur. Second, to ascertain whether the limit of variability of the fruit is reached with the typical two-winged and three-winged forms, and especially to find by extensive series of countings whether there is perfect discontinuity between di- and trimerous fruits, or whether these two types are connected by transition stages. If transitional conditions are found their relative frequency of occurrence was to be gotten.

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* Roeper, J. Linnaea **2**: 85. 1827.

† Schimper, C. Flora **12**: 433. 1829.

‡ Masters, M. T. Vegetable Teratology 364. 1869.

Nine classes of fruits were recognized among twenty-nine thousand examined. The distribution of the fruits among these classes is shown in the table.

TABLE OF FREQUENCY

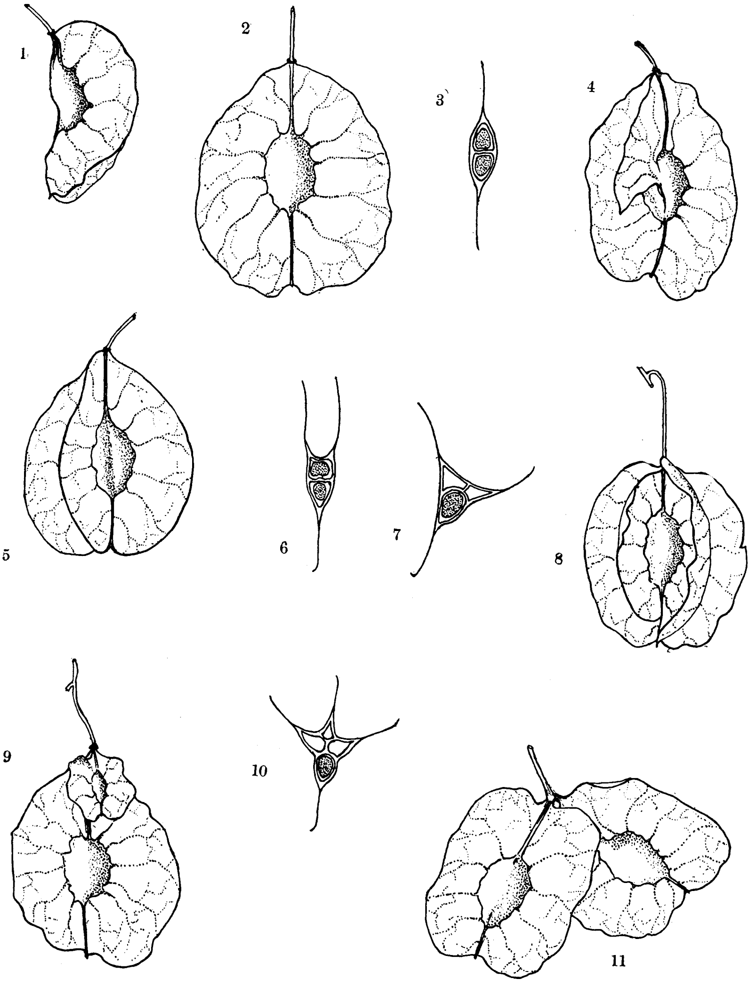
| CLASS OF FRUIT | Number of Shrub | | | | | | | | | | | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | F | G | H | I | J | K | |
| 1. One wing only developed | — | — | — | — | — | 1 | 1 | — | — | — | 1 | 3 |
| 2. Normal 2-winged condition | 4,400 | 1,077 | 1,797 | 4,080 | 2,238 | 923 | 3,969 | 772 | 3,257 | 3,865 | 2,323 | 28,701 |
| 3. Third wing present but less than half developed | 4 | 10 | — | 4 | 3 | — | 4 | 1 | — | 10 | — | 36 |
| 4. Third wing incomplete but over half developed | — | — | 1 | 3 | — | — | 1 | 1 | — | 2 | — | 8 |
| 5. Typical 3-winged condition | 17 | 22 | 2 | 40 | 11 | — | 14 | 3 | 15 | 69 | 4 | 197 |
| 6. Four wings, but 2 imperfectly developed | — | 1 | — | — | — | — | — | — | — | — | — | 1 |
| 7. Four wings, but 1 imperfectly developed | — | — | — | — | — | — | — | — | — | — | — | —— |
| 8. Typical 4-winged condition | — | 2 | — | — | 1 | — | — | — | — | 1 | — | 4 |
| 9. Paired fruits on the same pedicel | — | (1)* | — | — | (1) | — | — | — | — | (1) | — | (3) |

* This pair belonged to class 3 and is counted in with the 10 there.

It appears that in the individuals examined the anomalous fruits were rare; those with but a single wing occurred in only one one-hundredth of one per cent of the cases examined; the typical three-winged fruits formed far less than one per cent of the series. No stress is to be laid on these figures, for the percentage of anomalous organs may vary greatly from shrub to shrub; the relative proportion of the different grades of anomaly is of greater interest.

It is quite clear that conditions 3 and 4 are much more rare than either 2 or 5, but even with nearly 29,000 observations the numbers are too small to determine whether transitional stages between trimerous and tetramerous fruits are rare as compared with the perfectly developed condition.

Generally two-winged fruits have two cells while three-winged fruits have three cells. A considerable series of fruits, many of them not included in the table, were sectioned to verify this point. Incidentally the number of seeds developing was noted.



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Fruits with two wings and two loculés may have 0, 1, or 2 seeds. For frequencies I found:

| Seeds | 0 | 1 | 2 | Total |
|---|---|---|---|---|
| Frequencies | 47 | 412 | 77 | 536 |

Likewise for the three-winged fruits:

| Seeds | 0 | 1 | 2 | 3 | Total |
|---|---|---|---|---|---|
| Frequencies | 33 | 159 | 80 | 15 | 287 |

Of the 287 three-winged fruits, thirteen were possibly bilocular; the remainder were clearly trilocular. Perhaps in these apparently bilocular fruits the partition wall had simply broken down, but two wings may have developed on the backs of some of the carpels.

For the mean number of seeds per locule we have:

Two-winged, $A = 1.056$.
Three-winged, $A = 1.268$.

But I lay no stress on the comparison, both because of the smallness of the number of pods dealt with, and because the two-winged fruits sectioned were not gathered in proportion to the three-winged fruits from each individual tree, but were merely a random sample saved for another purpose. A detailed study of material so collected that the possibility of difference in fecundity of individual trees could not cast doubt on the results, might be profitable.

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## Explanation of plate 17

Diagrams of normal and abnormal fruits of *Ptelea*. FIG. 1; class 1. FIG. 2, 3; class 2, *in toto* and in cross section. FIG. 4; class 4. FIG. 5–7; class 5, *in toto* and in cross section. FIG. 8, 10; class 8. FIG. 9, 11; class 9.